What is claimed is:

1. A sensor for detecting changes in the distance between a first and a second location, having at least one substantially helically coiled optical fiber, which is able to be mechanically connected to at least one of the locations, and having a light transmitter and a detecting device for optical signals, the detecting device being able to generate an output signal, which is dependent upon the polarization state of the optical signal transmitted via the optical fiber.

2. The sensor as recited in Claim 1, wherein the detecting device is a polarimeter or a detector having a series-connected analyzer.

3. The sensor as recited in Claim 1 or 2, wherein the optical fiber is flexible in the helix direction and is capable of following to changes in distance between the first and the second location.

4. The sensor as recited in one of Claims 1 through 3, wherein the optical fiber is joined to an elastic carrier material, which, in response to mechanical loading of the optical fiber, permits a change in the form and, in response to the lack of a mechanical load, retains the optical fiber in its initial curved form.

5. The sensor as recited in one of the preceding claims, wherein the optical fiber is wound around at least one elongated carrier element, preferably a cylinder, the carrier element preferably being flexible.

6. The sensor as recited in one of the preceding claims, wherein the optical fiber is secured to the carrier element in such a way that it is movable in its wound form, but remains stabilized on the carrier element.

7. The sensor as recited in one of the preceding claims, wherein in the case of the optical fiber, one winding direction predominates; the optical fiber preferably has only one winding direction.

8. The sensor as recited in one of the preceding claims, wherein the light source produces linearly polarized light, and/or a linear polarizer is situated at the input end of the optical fiber.

9. The sensor as recited in one of the preceding claims, wherein a reference optical fiber path is provided, which simulates the optical fiber and over which and a second optical signal is transmitted, the optical signals transmitted over both paths being sensed in a common or in separate detecting devices, such that differences in the polarization state can be determined.

10. A method for detecting changes in the distance between a first and a second location comprising the following features:
a) mechanically coupling at least one of the locations to a substantially helically coiled optical fiber;
b) launching an optical signal having a known polarization state into the optical fiber;
c) sensing the optical signal transmitted over the connecting line in order to acquire information pertaining to its polarization state;
d) determining the change in distance from the information on the polarization state of the transmitted signal.

11. The method as recited in Claim 10, wherein the change in distance is determined by comparing the detected signal and, as the case may be, individual parameters of the detected signal to values determined in a calibration measurement which correspond to a specific distance.

12. The method as recited in Claim 10, wherein the change in distance is calculated from the detected signal and, as the case may be, from individual parameters of the detected signal and from the form of the three-dimensional curve of the optical fiber.

13. The method as recited in one of the Claims 10 through 12, wherein the polarization state of the optical signal following the transmission is compared to that prior to the transmission and/or to a reference polarization state.

14. The method as recited in Claim 13, wherein the reference polarization state is the polarization state of the optical signal measured following its propagation through the communication link in the mechanical idle state.

15. The method as recited in one of Claims 10 through 14, wherein the optical signal is detected, together with a reference signal.

16. The method as recited in one of the Claims 10 through 14, wherein linearly polarized light is launched into the optical fiber, and light having a defined linear polarization is detected.

add a1